

CLAIMS

1. Use of an anti-staling GH-61 polypeptide for preparing an edible product.
- 5 2. A method of preparing an edible product comprising heating a dough composition comprising an anti-staling GH-61 polypeptide.
3. The method of claim 2 comprising leavening and heating a dough composition comprising an anti-staling GH-61 polypeptide.
- 10 4. A composition comprising an anti-staling GH-61 polypeptide.
5. The composition of claim 4, characterized by being in the form of granules having a particle size distribution with more than 95 % (by weight) of the particles in the range from 25 to 500 micrometers.
- 15 6. The composition of claim 4, further comprising 0.5-100 mg GH-61 polypeptide per kilo composition.
- 20 7. The composition of claim 4, further characterized by being a dough composition.
8. The composition of claim 4, further comprising a maltogenic exo-amylase.
- 25 9. An isolated GH-61 polypeptide having an anti-staling effect in edible products
10. The polypeptide of claim 9, wherein the polypeptide is an enzyme.
- 30 11. The polypeptide of claim 10, wherein the enzyme has at least a minor activity against a substrate selected from the group consisting of oat xylan, birchwood xylan and wheat arabinoxylan.

12. The polypeptide of claim 9, comprising in it naturally occurring mature form conserved portions of a H at position 1, A or P at position 59, G at position 60, G at position 75, P or A at position 76, W or F at position 100, F or T at position 101, K or C at position 102, I or V or L at position 103, L or I or V or M at position 130, P at position 131, G and Xaa and Y at position 137-139, L or V or I or M at position 140, L or V or I or M at position 141, R at position 142, E or Q at positions 143-144, L or V or I at position 148, H or N at position 149, C at position 163 and P and G and P at position 209-211.
13. The polypeptide of claim 9 comprising the amino acid sequence of the mature polypeptide of SEQ ID NO:2, SEQ ID NO:4 or SEQ ID NO:6, an allelic variant thereof; or a fragment thereof that has an anti-staling effect in an edible product.
14. The polypeptide of claim 9 comprising an amino acid sequence which has at least 65% identity to the amino acids of the mature polypeptide of SEQ ID NO:2, SEQ ID NO:4 or SEQ ID NO:6.
15. The polypeptide of claim 9 differing at the most by ten amino acids from amino acids of the mature polypeptide of SEQ ID NO:2, SEQ ID NO:4 or SEQ ID NO:6
16. The polypeptide of claim 9 consisting of the amino acid of the mature polypeptide of SEQ ID NO:2, SEQ ID NO:4 or SEQ ID NO:6.
17. The polypeptide of claim 12 comprising at least one substitution, deletion or insertion outside the conserved portions of the amino acid sequence.
18. The polypeptide of claim 12 comprising at least one substitution inside the conserved portions.
19. The polypeptide of claim 17, wherein the number of substitutions, deletions or insertions is at the most 10.
20. The polypeptide of claim 9 encoded by nucleotide sequences which hybridize under very low stringency conditions with a polynucleotide probe selected from the group consisting of

- (i) the complementary strand of nucleotides 52 to 699 of SEQ ID NO:1, 46 to 957 of SEQ ID NO:3 or 58 to 660 of SEQ ID NO:5,
- (ii) the complementary strand of the cDNA sequence contained in nucleotides 52 to 699 of SEQ ID NO:1, 46 to 957 of SEQ ID NO:3 or 58 to 660 of SEQ ID NO:5
- 5 (iii) the complementary strand of nucleotides 46 to 857 of SEQ ID NO:3,
- (iv) the complementary strand of nucleotides 52 to 300 of SEQ ID NO:1, 46 to 501 of SEQ ID NO:3 or 58 to 300 of SEQ ID NO:5 or
- (v) the complementary strand of nucleotides 301 to 699 of SEQ ID NO:1, 502 to 957 of SEQ ID NO:3 or 301 to 660 of SEQ ID NO:5.

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21. The polypeptide of claim 20 encoded by a polynucleotide comprising the nucleotide sequence of nucleotides 52 to 699 of SEQ ID NO:1, 46 to 957 of SEQ ID NO:3 or 58 to 660 of SEQ ID NO:5 or sequences differing from 52 to 699 of SEQ ID NO:1, 46 to 957 of SEQ ID NO:3 or 58 to 660 of SEQ ID NO:5 by virtue of the degeneracy of the genetic code.

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22. The polypeptide of claim 21 encoded by a polynucleotide consisting of nucleotide sequence of nucleotides 52 to 699 of SEQ ID NO:1, 46 to 957 of SEQ ID NO:3 or 58 to 660 of SEQ ID NO:5 or sequences differing from 52 to 699 of SEQ ID NO:1, 46 to 957 of SEQ ID NO:3 or 58 to 660 of SEQ ID NO:5 by virtue of the degeneracy of the genetic code.

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23. The polypeptide of claim 9, obtained from a fungus.

24. A polynucleotide comprising a nucleotide sequence encoding a polypeptide of any of claims 9 to 23.

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25. The polynucleotide of claim 24, wherein the nucleotide sequence comprise a subsequence which encode:

- (a) a fragment of SEQ ID NO:2 that have an anti-staling effect in edible products and contains the conserved portions.,
- 30 (b) a fragment of SEQ ID NO:4 that have an anti-staling effect in edible products and contains the conserved portions or
- (c) a fragment of SEQ ID NO:6 that have an anti-staling effect in edible products and contains the conserved portions.

26. The polynucleotide of claim 25, wherein the nucleotide sequence comprise a subsequence of:
- (a) SEQ ID NO:1 which encode fragments of SEQ ID NO:2 that have an anti-staling effect in edible products and contains the conserved portions.
 - 5 (b) SEQ ID NO:3 which encode fragments of SEQ ID NO:4 that have an anti-staling effect in edible products and contains the conserved portions or
 - (c) SEQ ID NO:5 which encode fragments of SEQ ID NO:6 that have an anti-staling effect in edible products and contains the conserved portions.
- 10 27. The polynucleotide of claim 26, comprising a nucleotide sequence encoding the amino acid sequence of SEQ ID NO:2, SEQ ID NO:4 or SEQ ID NO:6 or the mature polypeptide thereof.
28. The polynucleotide of claim 27, comprising the region of SEQ ID NO:1, SEQ ID NO:3 or
- 15 SEQ ID NO:5 encoding the mature polypeptide.
29. The polynucleotide of claim 28, consisting of the region of SEQ ID NO:1, SEQ ID NO:3 or SEQ ID NO:5 encoding the mature polypeptide.
- 20 30. The polynucleotide of claim 24 comprising at least one mutation in the regions of SEQ ID NO:1 SEQ ID NO:3 or SEQ ID NO:5 encoding the mature polypeptides and where the polynucleotide encodes a polypeptide comprising a H at position 1, A or P at position 59, G at position 60, G at position 75, P or A at position 76, W or F at position 100, F or T at position 101, K or C at position 102, I or V or L at position 103, L or I or V or M at position 130, P at position 131, G
- 25 and Xaa and Y at position 137-139, L or V or I or M at position 140, L or V or I or M at position 141, R at position 142, E or Q at positions 143-144, L or V or I at position 148, H or N at position 149, C at position 163 and P and G and P at position 209-211.
31. The polynucleotide of claim 24 comprising a nucleotide sequence which has at least
- 30 65% identity with nucleotides 52 to 699 of SEQ ID NO:1, 46 to 957 of SEQ ID NO:3 or 58 to 660 of SEQ ID NO:5.
32. The polynucleotide of claim 24 which hybridizes under very low stringency conditions with a polynucleotide probe selected from the group consisting of:

- (i) the complementary strand of nucleotides 52 to 699 of SEQ ID NO:1, 46 to 957 of SEQ ID NO:3 or 58 to 660 of SEQ ID NO:5,
 - (ii) the complementary strand of the cDNA sequence contained in nucleotides 52 to 699 of SEQ ID NO:1, 46 to 957 of SEQ ID NO:3 or 58 to 660 of SEQ ID NO:5
 - 5 (iii) the complementary strand of nucleotides 46 to 857 of SEQ ID NO:3,
 - (iv) the complementary strand of nucleotides 52 to 300 of SEQ ID NO:1, 46 to 501 of SEQ ID NO:3 or 58 to 300 of SEQ ID NO:5,
 - (v) the complementary strand of nucleotides 301 to 699 of SEQ ID NO:1, 502 to 957 of SEQ ID NO:3 or 301 to 660 of SEQ ID NO:5,
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33. A nucleic acid construct comprising a nucleotide sequence of claims 24-32 linked to one or more control sequences that direct the expression of the coding sequence in a suitable host cell under conditions compatible with the control sequences.
- 15 34. A recombinant expression vector comprising the nucleic acid construct defined in claim 33.
35. A recombinant host cell comprising the nucleic acid construct of claim 33.
- 20 36. A method for producing a polypeptide of claims 9 to 23 comprising:
- (a) cultivating a strain, which in its wild-type form is capable of producing the polypeptide, to produce the polypeptide; and
 - (b) recovering the polypeptide.
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37. A method for producing a polypeptide of claims 9 to 23 comprising:
- (a) cultivating a recombinant host cell as defined in claim 35 under conditions conducive for production of the polypeptide; and
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- (b) recovering the polypeptide.
38. A transgenic plant comprising a nucleotide sequence of claims 24 to 32 capable of expressing a polypeptide of claims 9 to 23.

39. A method for producing a polypeptide of claims 9 to 23 comprising (a) cultivating a transgenic plant or a plant cell comprising a nucleotide sequence of claims 24 to 32 under conditions conducive for production of the polypeptide; and (b) recovering the polypeptide.